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An apparatus and a method for distributing a plurality of services on demand are disclosed, including control devices that are each connected to at least one subscriber display unit, such as a TV set. Each control device provides the TV set with a locally stored, menu oriented selection system for selecting from the plurality of services, and establishes a connection via an exchange unit to the one of a plurality of intermediary devices associated with the selected service. The intermediary device, such as a computer, communicates via a first network, such as an Ethernet-type network, with a plurality of servers for providing the different services. The servers are connected to a high-speed communication network. The intermediary device controls the server corresponding to the selected service, causing the server to place the selected service on the high-speed network at a predetermined location for the subscriber. In this way, the selected service is provided to the subscriber's display unit.

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METHOD AND APPARATUS FOR DISTRIBUTING SERVICES ON DEMAND

BACKGROUND

5 This invention relates to a method and apparatus for distributing a plurality of services on demand, e.g., a video-on-demand system.

 In a video-on-demand system, it is possible to order a video film one wants to see, e.g., by making a selection from a menu displayed on a television set, and to view the film immediately on the TV set. In such a system, a subscriber usually
10 pays for the films seen and/or for the time viewing the films.

 Various kinds of video distribution systems have been described. For example, U.S. Patent No. 4,792,849 to McCalley et al. describes a digital interactive communication system for supplying pre-recorded video presentations to subscribers in response to telephone signals. Subscriber requests are received by
15 voice network interface units that are connected to a local area network (LAN) having a ring topology. A plurality of data processors are also connected to the LAN, and a number of these processors are dedicated to each subscriber during each session. Other processors and a large-scale data base are also coupled to the LAN, the data base containing digital data representing the video presentations
20 selected by subscribers. The large-scale data base is also connected to a second ring-topology LAN for transmitting the selected digital information to a channel server that converts the digital information to a format suitable for distribution through a community access television (CATV) network to the subscribers' television sets.

25 U.S. Patent No. 5,247,347 to Litteral et al. describes a public switched telephone network (PSTN) architecture for video-on-demand services. The PSTN provides digital video signals from a video information provider to one or more of a plurality of subscribers, who order video programs using either standard telephones and the PSTN or dedicated control devices and an ISDN packet network.

30 Video and audio data in a compressed digital format are stored and retrieved by

video providers, which in response to either audio or DTMF control signals from subscriber telephones or to digital packet data signals supply the compressed digital data either to a digital cross-connect system or directly to subscribers. The digital cross-connect system supplies the compressed digital data to selected central office
5 interfaces, which frequency multiplex the compressed digital data and conventional telephone signals onto the subscribers' conventional local loops. Subscriber interface units demultiplex the compressed digital data and telephone signals, and supply the compressed digital data to decoders for generating data presented to the subscribers.

10 U.S. Patent No. 5,130,792 to Tindell et al. describes a store-and-forward system, in which digitized, temporally compressed, video programs are transferred between locations through commercial telephone networks that have suitably high-speed communication links, such as optical fibers. Programs are requested by generally conventional phone calls to a central facility, which responds by calling
15 special receiving units at the requestors' locations. The central facility downloads the requested programs from a mass storage device through a central processor and the commercial telephone network into the receiving units, which decompress the programs for normal viewing.

U.K. Patent Publication No. GB 2 267 625 by Laycock et al. describes a
20 dial-up aural and visual communication system in which video equipment, such as television cameras and displays, are connected through coder/decoders (codec) to a switch, such as a private branch exchange (PBX), that is in turn connected to a PSTN. Voice-communication devices, such as standard telephones, are also connected to the PSTN. The codecs, which may communicate through the ISDN,
25 switch video between local lines and may be shared by several users. The codecs are closely coupled to the switch, rather than to the subscribers, and the codecs permit images to be transmitted across the networks accessed by the switch at various signal transmission rates.

U.S. Patent No. 5,278,889 to Papanicolaou et al. describes a video telephony
30 system that is based on a cable television system. A cable subscriber can

communicate with another cable subscriber by a video telephone call established through a switched telephone network, which can include ISDN-capable switches. The video telephone numbers for the cable subscribers are selected to be the same as standard telephone numbers used for standard telephone calls to those subscribers.

Part of another example of a video-on-demand system is shown in Fig. 1. The system 10 would include control devices 12-1, 12-2, ..., 12-N, each of which would be provided in or in association with a subscriber TV set, that would communicate via respective communication links 14-1, 14-2, ..., 14-N with respective ports of a central processing unit 16, such as a supercomputer. Each communication link would typically transfer information at a rate between two megabits per second and six megabits per second (2-6 MBPS).

Subscribers would select the programs they wanted to see via respective control devices 18-1, 18-2, ..., 18-N, and information about the selected programs would be transmitted via the links 14-1, 14-2, ..., 14-N to the respective ports of the central processing unit 16. The programs provided by the video-on-demand service could be stored in the computer 16 and/or in a video library (not shown). The ports of the computer 16 would include interfaces (not shown) that would receive the selected programs, whereby the program information would be transmitted on the links 14-1, 14-2, ..., 14-N to the intended TV sets 12-1, 12-2, ..., 12-N.

The main disadvantage of a system in accordance with Fig. 1 is that the program menus would be stored in the central computer 16. Thus, the computer 16 would need to keep track of each subscriber in real time during the whole running period of each program, and probably during the whole time the system is operational.

Another disadvantage is that all central processing units 16 and control devices 12-1, 12-2, ..., 12-N would need to be directly compatible because the control devices would directly control the central processing units 16 in real time.

A third and very costly disadvantage is that due to the centralized menu system, modification and addition of service classes would entail an extensive and integrated expansion of the system. This would impose extensive requirements on the compatibility between the control devices and the central processing units.

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SUMMARY

Applicants' invention solves these problems, providing a video-on-demand system that does not require extensive changes in design to offer more services to subscribers, that has an open platform, and that does not need to keep track of each subscriber in real time during the whole running period. The term "open platform" will be understood to mean that hardware and software from different manufacturers can be used.

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A system in accordance with Applicants' invention comprises control devices that are connected to subscriber display units, e.g., TV sets, each control device being connected to at least one display unit. Each control device provides its respective display unit with a menu-oriented selection system for selecting a desired service. Thus, the selection system is locally stored. Also, each control device establishes connections via an exchange unit to specific intermediary devices, e.g., computers, each of which corresponds to a service selectable via the selection system.

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The intermediary devices are each connected to a plurality of server devices via a first communication network, e.g., an Ethernet-type network. The server devices provide the different services, e.g., films for a video-on-demand service, selectable via the selection system. Each server device is connected to a second communication network, e.g., an asynchronous-transfer-mode (ATM) local-area network (LAN). Advantageously, an ATM LAN is a broad-band type of communication network. Each intermediary device controls its respective server device in response to the subscribers' menu selections, causing the server to place the respective selected service article on the second communication network at predetermined addresses corresponding to the selecting subscribers. The selected

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service article is then transmitted to the display units of the selecting subscribers via their control devices.

In another aspect of Applicants' invention, a method for distributing a plurality of services on demand comprises the steps of transmitting a main menu
5 from a control device to a local display unit and transmitting control signals from an input device to the control device, the control signals corresponding to a service selected from the main menu.

The method further includes the steps of transmitting an off-hook signal and a service indicating signal from the control device to an exchange unit when a
10 service has been selected, these signals being used for establishing a connection between the control device and a first intermediary device corresponding to the selected service. When a service has been selected, data signals regarding the selected service are transmitted from the control device through a corresponding first intermediary device to a server device that provides the selected service.

Also, the method includes the steps of the server's placing the respective
15 selected service on a communication network in response to the data signals and transmitting the selected service to the respective control device for further transmission to the respective display unit.

In another embodiment, there is provided a method for distributing on
20 demand a plurality of service articles. The method comprises the steps of transmitting a main menu from a control device to a display unit and transmitting control signals from a control means to the control device when selections from the menu are being made via the control means. The method also includes the steps of transmitting an off-hook signal and a service indicating signal from the control
25 device to an exchange unit when a type of service and a service article have been selected. These signals are used for establishing a connection between the control device and a first intermediary device corresponding to the selected type of service.

The method further includes the step of transmitting data signals regarding the selected service article from the control device to a server device that provides
30 the selected service article. Activation of the server device places the selected

service article on the communication network. The selected service article is then transmitted to the control device for further transmission to the display unit.

BRIEF DESCRIPTION OF THE DRAWINGS

5 These and other features and advantages of Applicants' invention will be apparent from this description and the associated drawings in which:

Fig. 1 is a block diagram of a typical video-on-demand system;

Fig. 2 is a block diagram of a system for distributing services on demand in accordance with Applicants' invention;

10 Fig. 3A is a block diagram of a control device for a system in accordance with Applicants' invention;

Fig. 3B is an exemplary video encoder which can form part of the compression-and-input block 70 of Figure 2;

15 Fig. 3C is an exemplary audio encoder which can also form part of the compression-and-input block 70 of Figure 2;

Figs. 4A-4C present a flow chart of a first embodiment of a method for distributing on demand a plurality of services in accordance with Applicants' invention;

20 Fig. 5 is a partial flow chart of a second embodiment of a method for distributing on demand a plurality of services in accordance with Applicants' invention;

Fig. 6A is a partial flow chart of a method for controlling a system according to Applicants' invention and using a telephone when the system comprises second intermediary devices; and

25 Fig. 6B is a partial flow chart of a method for controlling a system according to Applicants' invention and using a telephone when the system does not comprise second intermediary devices.

DETAILED DESCRIPTION

Fig. 2 is a block diagram of a system 30 for distributing services on demand in accordance with Applicants' invention. The system 30 may have N control devices, where N is an integer, and thus there are at least N display units, such as a TV set 32-1 of a subscriber 1, connected to the system 30. Defining a control device as a subscriber, the system 30 has N subscribers.

Each of the plurality N of control devices 34 communicates via a communication link 36 to at least one of a plurality M of display units 32. Only the control device 34-1 and communication link 36-1 for subscriber 1 are shown. If each subscriber has only one TV set connected to one control device, $N = M$, but it will be appreciated that the number M of display units 32 may differ from the number N of control devices 34, or subscribers. For example, a subscriber could have two or more TV sets connected to a single control device, in which case $M > N$, and as described below, the same program, e.g., a film, would be shown on the different TV sets for that subscriber. For simplicity, the following description assumes that $M = N$, viz., each subscriber 1, 2, ..., N has one TV set, 32-1, 32-2, ..., 32-N, each of which is connected to one respective control device, 34-1, 34-2, ..., 34-N.

Referring to Fig. 3A, each control device 34 comprises a processor (CPU) 99 for coordinating and/or performing the various functions attributable to these control devices. Exemplary functions include: transmitting signals to and receiving signals from the exchange unit 50 for establishing and disestablishing connections via the exchange unit 50 between the control device and its respective first intermediary device 52 and comparing a service article received at its respective display unit 32 to the service article selected by its respective controlling means 38. If the CPU 99 determines that the received service article is not the article selected, the respective control device 34 repeats the selection process to obtain the correct service article.

A memory 100 is provided in control device 34 for locally storing commands and data relating to a menu-oriented selection system, which preferably has a tree structure. The menu-oriented selection system is used for selecting a kind of service, e.g., video on demand, home shopping, etc., and for selecting specific
5 service articles, e.g., a specific film from the video-on-demand service, a specific product from the home shopping service, etc. Each control device 34 supplies its respective display unit 32 with the menu-oriented selection system, which is described in more detail below.

Information sent to control device 34 is received via I/O device 102. This
10 block represents several different units to simplify the drawing, including both control and interface circuitry. Among various information which may be received by control device 34 are encoded signals relating to, for example, selected service articles or updates to the subscriber's menu of service articles from which selections can be made. It will be appreciated that Applicants' control device has significantly
15 more functionality than similar devices provided in previous systems. For example, in comparison to the control device 130 described in the above-cited Litteral patent, Applicants' control device 34 includes a decoder 106 and can operate with a substantially unlimited variety of current and future servers as a result of the menu-oriented selection system. Decoder 106 serves to reverse the encoding process of
20 received signals, for example the video encoding described below with respect to Figures 3B and 3C.

Smart card 108 which can comprise, for example, an IC chip (not shown), is used to store subscriber information associated with the control device 34. This information includes, for example, a list of those services to which the subscriber
25 has subscribed. This list can be updated as described below. Block 110 represents control functions provided for pointing device 38, e.g., mouse input and output control. Those skilled in the art will appreciate that such control functions can include, for example, an I/O controller, video memory, etc. Block 112 represents various other I/O functionality including output of the decoded
30 service articles to display unit 32, output of menus generated using data stored in

memory 100, control signals, and the like. Control device 34 can also include other I/O devices, such as an infrared interface (for remote control), graphical generators, etc.

5 The system 30 further comprises N means 38 for controlling the N control devices 34 such that the menu-oriented selection system is shown on the M display units 32. One controlling means 38-1 is shown in Fig. 2, and each controlling means 38 corresponds to a respective control device 34. The controlling means 38 can, for example, be a suitably programmed conventional remote control, a radio- or infrared-transmitting mouse.

10 Each control device 34 is also connected to a respective first Asymmetrical Digital Subscriber Line (ADSL) unit 40, to which a telephone set 42 is connected. The ADSL units 40 provide high- and low-pass filtering of signals, but they can be omitted in communication systems, such as CATV systems, in which there are direct, high-speed links connected as down-links to the control devices 34. Each
15 first ADSL unit 40 is connected, via a respective communication link 44, to a respective second ADSL unit 46, and each of the plurality of second ADSL units 46 is connected, via a respective communication link 48, to an exchange unit 50. The ADSL units frequency multiplex voice and conventional telephone signals, e.g., DTMF signals, to and from the telephone sets 42 and signals to and from the
20 control devices 34.

The exchange unit 50 provides connections between the control devices 34 and certain ones of a plurality n of first intermediary devices 52-1, ..., 52-n, where n is an integer. As described further below, the ones of the first intermediary devices that are connected to the control devices correspond to the services selected
25 via the menu-oriented selection systems. The exchange unit 50 can be, for example, an AXE-10 type unit that is commercially available from this application's Assignee, and the first intermediary devices 52 can be, for example, computers of a suitable type or types, such as current commercially available desktop machines.

Each first intermediary device 52-1, ..., 52-n is connected via a respective
30 communication link 54-1, ..., 54-n to a first data network 56, which can be, for

example, a data network operating according to the Ethernet protocol. Such an Ethernet-type network provides for data communication at a rate of 10 MBPS. The first data network 56 is, in turn, connected via a plurality m of communication links 58-1, ..., 58- m to a like plurality m of servers 60-1, ..., 60- m that provide the
5 different selected service articles, e.g., specific films from a video-on-demand service, specific products from a home shopping service, specific software items, etc.

A major function of the first intermediary devices 52 is to translate coded commands from the control devices 34 into signals appropriate for the servers 60
10 to which they are connected. The coded commands could be dual-tone, multi-frequency (DTMF) signals that represent selected service articles, although it will be understood that any suitable coded commands could be used. Entering commands through the control devices 34, rather than through the telephones 42, and using the menu-oriented selection system results in a transparent network, which
15 is a network able to handle all kinds of different data formats.

The first intermediary devices translate the commands into a "query language" appropriate to the desired server. After all, the servers may be obtained from different manufacturers and thus may respond to different languages, i.e., the query languages. Providing the first intermediary devices contributes to the
20 transparency of the network.

Besides normal handling of and response to signals from a conventional public exchange (e.g., ringing signals, off-hook signals, etc.), the first intermediary devices 52 detect identification signals, such as personal identification numbers (PINs), sent by the control devices 34.

25 The servers 60 can be, for example, server computers, and m is an integer, where $m \geq n$ is more commonly true. Each server 60-1, ..., 60- m includes a hard disk memory system, e.g., a CD-ROM system, and is configured such that many subscribers can simultaneously access the service and service articles corresponding to the server, e.g., the same film. The different service articles are preferably
30 stored in the servers in compressed format, e.g., the MPEG standard format for

compression of motion pictures. Servers that are suitable for a system in accordance with Applicants' invention are commercially available, including the Video Stream Server made by IBM.

The system 30 is very flexible when each first intermediary device 52-1, ..., 52-n corresponds to only one respective service and the service articles associated with that service are stored in one or more of the servers 60-1, ..., 60-m. It is easy to expand the system 30 when one wants to add a new service by adding one intermediary device 52 and one or more additional servers 60. The added first intermediary device 52 and server(s) 60 need only be adapted to each other, e.g., be able to communicate with each other and the rest of the system 30.

Each server 60-1, ..., 60-m is connected via a respective communication link 62-1, ..., 62-m to a high-speed communication network 64. The communication network 64 advantageously may use the ATM protocol, for example, and can be any of many different configurations, e.g., a ring network, a star network, a bus network, etc.

Also, each server 60-1, ..., 60-m is connected via a respective communication link 66-1, ..., 66-m to a second data network 68, which is, for example, an Ethernet-type network. The second data network 68 is connected to a compression-and-input means 70 for compressing and entering into the menu-oriented selection system information about new services and new service articles. Also, the compression-and-input means 70 is used for compressing and entering amendments of the contents of the menu-oriented selection system that may be necessary or appropriate from time to time. For example, when new films are to be offered by the video-on-demand service, the selection system must be changed. The necessary amendments are provided to the system 30 through the compression-and-input device 70 and are transmitted to the appropriate control devices 34-1, ..., 34-M.

It is possible that an amendment would not be transmitted to one or more of the control devices 34 because whether an amendment is transmitted to a particular control device depends on which services that subscriber has subscribed to. The

control devices are selected based on their ATM addresses. The system 30 is economical as a result of such operation because subscribers only receive that for which they have paid.

For example, the smart card 108 in Figure 3A can be used to store
5 information pertaining to which services are subscribed to by the user of controller device 34-1. When changes or amendments are made to the available list of services, if that particular subscriber pays for such new services, a compressed signal is transmitted from the compression-and-input device 70, through second data network 68, communication network 64, the monitoring and recording means 72,
10 the transport network 78 and the ASDL units to the controller 34-1.

As examples of circuitry which can be used to compress video and audio service signals, reference is made to Figures 3B and 3C, respectively. Figure 3B illustrates a video encoder according to an exemplary embodiment of the present invention. The incoming signal can be, for example, a CVBS signal from a laser
15 disc player (not shown). An A/D converter 302 is used to translate the incoming analog signal into a digital video signal. The A/D converter 302 is synchronized, using signal Sync A, with the A/D converter for the audio portion of the signal described below and illustrated in Figure 3C. The digital video signal is then bit-mapped in a line coder 304 before being encoded. The video encoder 306 is also
20 synchronized with the audio encoder (shown in Figure 3C), using the Sync B signal.

The encoded signal is processed in six signal processors 308, grouped in three pairs. The processing algorithms for each pair focus on signal processing of the encoded video for a particular color, i.e., Red, Green and Blue. The two DSPs 308 within each pair have different algorithms for each specific color, for example,
25 one focused on vertical comparisons and one focused on horizontal comparisons of the encoded frames.

The comparators A1, A2, and A3 in Figure 3B are used to compare the results from the signals which have been processed horizontally and vertically for each color. This comparison is performed to increase picture quality since the best
30 result is selected by each of the comparators. The outgoing signals from these

comparators are encoded signals optimized with focus on one color and are, therefore, referred to as R', G', and B'.

The R', G' and B' signals are then compared in comparator 310 where a composite signal is created. Comparator 310 is synchronized with comparators 328
5 and 330 in Figure 3D in the audio encoder using signal Sync C. The resulting signal is decoded in decoder 312 and compared with the outgoing signal from line coder 304 in comparator 314. If variances between the signal from line coder 304 and the signal from comparator 310 are too large, then a signal is sent back to comparator 310 to compensate for such variances.

10 Buffer 316 is used to buffer incoming frames from the video encoder and an incoming stereo signal from the audio encoder described below. The output from buffer 316 is an MPV signal with MPEG-1 encoded video and an MPA signal for audio. These can be provided, for example, over a SCSI interface.

An exemplary audio encoder is illustrated in Figure 3C. Therein, the
15 incoming signals are the left and right channels of an analog audio signal from, for example, a laser disc player. These signals are then digitized using A/D converter 320, which is synchronized with A/D converter 302 as described above using signal Sync A.

Next, the digitized signal is processed through block 322. This signal
20 processing includes a number of steps for increasing the quality of the digital signal which have not been separately illustrated in the Figure so as to avoid obscuring more significant features of the audio encoder. Exemplary signal processing units represented by block 322 include: noise reduction, noise gating, compression, equalization, and gain control.

25 Encoding is performed using audio encoder 324. Both audio encoder 324 and video encoder 306 can be implemented using, for example, Cube-C processors. These encoders are synchronized using signal Sync B. The output from encoder 324 is processed in four DSPs 326, two for each channel, and then compared in comparators 328 and 330. These comparators 328 and 330 are synchronized with

comparator 310 in the video encoder using signal Sync C. The encoded audio signals are then output to buffer 316 as described above.

The system 30 further comprises a monitoring and recording means 72 that is connected via a communication link 74 to the communication network 64 and via
5 a communication link 76 to the first data network 56. Apart from being transparent to the information flow to the subscribers, one of the functions of the monitoring and recording means 72 is the recording of identifications and time periods of service articles that have been transmitted. This makes it possible for artists and film companies to obtain payment for the actual uses of the offered service articles.
10 It is currently believed that the functions of the monitoring and recording means 72 can be carried out by a device such as the model S2000 commercially available from Silicon Graphics, Inc.

The monitoring and recording means 72 may be connected, via a high-speed transport network 78, for example, to a demultiplexer 80, which in turn may be
15 connected via communication links 82-1, ..., 82-M to the second ADSL units 46-1, ..., 46-M. The network 78 can be any transport network, e.g., SONET, SDH, CATV, etc., that has sufficient bandwidth. It is preferable that the demultiplexer 80 should handle as many communication links 82 as there are subscribers/control devices, i.e., N. In that respect, the demultiplexer 80 is system dependent. In this
20 way, selections (commands) from the subscribers reach the servers through the exchange 50 and Ethernet first data network 56, and service articles (data) from the servers reach the subscribers through the ATM communication network 64, means 72, and transport network 78.

In some embodiments, the first and second ADSL units 40, 46 can be
25 omitted, in which case the subscribers are connected to the exchange unit 50 by ordinary telephone lines, such as wires and optical fibers, and the demultiplexer 80 is connected to the control devices 34 by coaxial cables, optical fibers, or radio links. In such embodiments, the system is similar to a CATV network.

The system 30 further comprises a network management unit 83, which is
30 connected to the first data network 56. The network management unit 83 is mainly

used for monitoring the first data network 56, for detecting faults in the system 30, and for billing purposes. It will be appreciated that the hardware and software features of the network management unit 83 are largely determined by the desires of the network operator.

5 The system 30 may also include a plurality M of second intermediary devices 84-1, ..., 84-M, which are connected via respective communication links 86-1, ..., 86-M to the second ADSL units 46-1, ..., 46-M. Also, the second intermediary devices 84-1, ..., 84-M are connected to the first data network 56 via respective communication links 88-1, ..., 88-M. The second intermediary devices 84-1, ...,
10 84-M act like switches and relieve the exchange unit 50 when subscribers have selected services that entail a large volume of control signals from the controlling means 38, such as a video game played between separately located subscribers. For example, when subscriber 1 selects a service article like a video game, signals are transmitted to the second intermediary device 84-1 via the link 86-1, not via the
15 exchange unit 50. This functionality distinguishes the second intermediary devices from a direct link (bypassing a voice switch) through, say, an ISDN channel interface.

 This arrangement makes use of the three channels available from a conventional ADSL unit, namely, a two-way speech channel, a two-way data
20 channel, and a video channel. In the system 30 according to Applicants' invention, the communication links 48-1, ..., 48-M are speech and signal channels; the communication links 82-1, ..., 82-M are video channels; and the communication links 86-1, ..., 86-M are data channels for signals.

 Each of the first intermediary devices 52-1, ..., 52-n further comprises a
25 respective modem 94-1, ..., 94-n for receiving and responding to signals from the exchange unit 50. If the control devices transmit data signals as conventional tone signals, the modems 94 are suitable tone-signal transmitter/receivers.

 As seen in Fig. 2, the exchange unit 50 in the system 30 can be connected to a public switched telephone network (PSTN) 96, and the communication network
30 64 can be connected to a gateway node 98. In this way, the system 30 can be

connected to another system 30' and its data networks and gateway node 98', which are indicated by dotted lines in Fig. 2.

If a selected service article is not found in the system 30 most closely connected to the subscriber, the exchange unit 50 in that system could establish a telephone-line connection to the exchange unit in another system 30' that contains the selected service article. This is analogous to establishing a call connection between two subscribers connected to different nodes in an ordinary telephone network. The selected service article would be retrieved in the other system 30' in the manner described above, and that other system's server would place the selected service article in another high-speed communication network, similar to the high-speed communication network 64, that advantageously would use the ATM protocol. After passing through the gateway unit 98', the selected service article would be communicated to the gateway unit 98 through a wide area network 99.

For example, if a subscriber in the system 30 obtains a service article from the system 30', the system 30 preferably takes care of the billing steps. Network management units 83, 83' in both systems 30, 30' "know" where all service articles are resident. This information is transferred to each relevant control device 34, 34'. Conveniently, the systems 30, 30', etc. use the same identification numbers for the same service articles. In this way, the selection of the system 30 or the system 30' is made in the control devices 34, not in the exchange unit 50.

Figs. 4A-4C present a flow chart showing the steps of a method for distributing a plurality of services on demand in accordance with Applicants' invention. The reference 500 refers to a subscriber's activating the display unit(s) 32 and the control device 34, by applying electric power, for example. At 502, the control device transmits a main menu of the menu-oriented selection system to the display unit, which displays the main menu. At 504, the subscriber's use of the controlling means 38 to select a service or service article generates control signals that are transmitted from the controlling means 38 to the control device 34.

The menu-oriented selection system includes a computer program that is locally stored and executed, i.e., the control device includes a processor and

memory. The selection system is organized as, for example, a tree structure, in which each selection made via the controlling means 38 corresponds to the passing of a branch point in the tree. When a service article is ordered, a predetermined data signal is sent to the PCQs 94 (and PCXs 84) seen in Fig. 2.

5 At step 506, a new menu picture is transmitted from the control device to the display unit and is shown thereon in response to the control signals generated by the subscriber. It will be understood that steps 504 and 506 are generally repeated until the selection system determines, at step 508, that an available type of service has been selected.

10 When the answer in step 508 is affirmative, the signalling means 102 in the control device 34 transmits an off-hook signal to the exchange unit 50 (step 510), which responds by sending a dial tone to the signalling means 102 (step 512). In response to the dial tone, the signalling means 102 transmits, at step 514, a service-indicating signal to the exchange unit 50. The service-indicating signal includes the
15 number of the first intermediary device 52 that corresponds to the selected type of service. The first intermediary device's number is analogous to the B-number in a conventional telephone system.

 The exchange unit 50 analyzes the digits in the B-number and checks that the designated first intermediary device 52 is available. If so, the exchange unit
20 transmits, at step 516, a conventional ringing signal to the selected first intermediary device 52 and a conventional ringing tone to the control device 34. In response to the ringing signal, the selected first intermediary device transmits a conventional off-hook signal to the exchange unit, which establishes a connection between the control device 34 and the first intermediary device 52 (step 518). The system is then ready
25 to receive further control signals from the controlling means 38 and control device 34.

 The subscriber continues making selections, and for each selection the controlling means 38 transmits control signals to the control device 34 (step 520) and the control device transmits a new menu picture to the display unit 32 for
30 display (step 522). Steps 520 and 522 are repeated until the desired service article,

e.g., a specific film, has been selected (step 524). In essence, there are no restrictions on the kind of control signals that can be used; DTMF signals, conventional binary digital signals, and the like are suitable.

5 When the answer at step 524 is affirmative, the control device 34 sends data signals regarding the selected service article via the exchange unit 50 and the first intermediary device 52 to the server 60 corresponding to the selected service article (step 526). Then, the signalling means 102 in the control device 34 transmits a conventional on-hook signal to the exchange unit (step 528), and the connection between the control device 34 and the first intermediary device 52 is disestablished
10 by the exchange unit 50.

The selected server 60 then is activated and the selected service article is placed on the communication network 64 at a position in the protocol that is predetermined for the subscriber who made the selections (step 532). Then, at step 534, the selected service article is transmitted from the server 60 to the control
15 device 34.

At step 536, the comparing means 104 in the control device 34 determines whether the received service article corresponds to the selected service article. If the answer at step 536 is negative, steps 510-536 are repeated. On the other hand, if the answer at step 536 is affirmative, the decoding device 106 in the control
20 device 34 decodes (at step 538) the compressed service article, converting it to a format appropriate to the display unit 32. The selected service article is then shown on the display unit, at step 540.

Fig. 5 is a partial flow chart of a second method for distributing a plurality of services on demand in accordance with Applicants' invention. The second
25 method is the same as the method described above as to steps 500-506, which are not shown in Fig. 5. Steps 504 and 506 (Fig. 4) are repeated until, at step 608 (Fig. 5), the service article has been selected (the selection process has ended) via the controlling means 38. If the answer at step 608 is affirmative, the method continues with steps 510-518 of the method described in connection with Fig. 4.
30 After step 520, when a connection between the control device and first intermediary

device is established, the method continues immediately with steps 526-540 as described in Fig. 4.

Fig. 6A is a partial flow chart of a method of controlling a system according to Applicants' invention that has M second intermediary devices and, at the same time, of using the telephone. Suppose a subscriber uses the system 30 to view a film on the display unit and someone else uses that subscriber's telephone. When the subscriber wants to pause or stop the film, control signals are sent from the controlling means 38 and control device 34 to the first intermediary device. It is not possible to use directly a connection via the exchange unit for these control signals, however, because such a connection is blocked by the on-going telephone call. To avoid this, the control signals are transmitted via the appropriate second intermediary device 84 to the server 60, at step 700 in Fig. 6A. Step 700 can be executed anytime after step 534 in the methods illustrated by Figs. 4 and 5.

Fig. 6B is a flow chart of a method of controlling a system according to Applicants' invention and at the same time using the telephone when the system does not include second intermediary devices. When control signals are sent from the controlling means 38 to the control device 34, the control device transmits a call-interrupt signal (e.g., a conventional DTMF "R2" signal in a telephone system) to the exchange unit 50 for interrupting the ongoing telephone call (step 702). In response to the call-interrupt signal, the exchange unit interrupts the call, placing it on hold at the exchange unit, and provides a dial tone to the control device 34 for a secondary connection.

In response to the dial tone, the control device, at step 704, transmits to the exchange unit the number (B-number) of the first intermediary device corresponding to the selected service article, and the exchange unit establishes a secondary connection between the control device and the first intermediary device. Then, at step 706, the control device 34 transmits the control signals needed to attain the desired action.

When the desired action has been executed, at step 708, the comparing means 104 causes the control device to transmit a call-restore signal (e.g., a

conventional DTMF "R2" signal) for disconnecting the secondary connection between the control device and the first intermediary device and for restoring the telephone call that was placed on hold. Depending on the desired action, the interruption in the first telephone call will usually be short, only 0.5 - 1 second.

5 It is, of course, possible to embody the invention in specific forms other than those described above without departing from the spirit of the invention. The embodiments described above are merely illustrative and should not be considered restrictive in any way. The scope of the invention is determined by the following claims, rather than the preceding description, and all variations and equivalents
10 which fall within the scope of the claims are intended to be embraced therein.

CLAIMS:

1. A system for supplying to a subscriber on demand a selected one of a plurality of services and a selected service article that is available through the selected service, comprising:

5 a control device, wherein the control device includes a memory for storing a menu-oriented selection system and receives information about the services via the menu-oriented selection system;

a display unit, connected to the control device, for presenting to the subscriber a menu generated by the menu-oriented selection system, information
10 about the plurality of services, and the selected service article;

an exchange unit, wherein the exchange unit is selectively connected to the control device;

a plurality of first intermediary devices, wherein the plurality of first intermediary devices are mutually connected through a first data network, and each
15 first intermediary device respectively corresponds to at least one service and is selectively connected to the exchange unit;

a plurality of servers for providing the plurality of services and service articles, wherein the servers are connected to the first data network and are controlled by the first intermediary devices through command signals exchanged
20 through the first data network, the servers are further connected to a high-speed communication network, and the selected service article is placed on the high-speed communication network by the respective server; and

means, connected to the high-speed communication network, for transmitting the selected service article from the respective server to the control device;

25 wherein a connection between the control device and the first intermediary device corresponding to the selected service is established through the exchange unit, and information about the selected service, the selected service article, and the subscriber is communicated through the connection.

2. The system of claim 1, wherein the control device further comprises means for signalling and for establishing and disestablishing the connection.

3. The system of claim 2, further comprising input-and-compression means for entering and compressing service articles and amendments of the menu-oriented selection system, wherein the plurality of servers are connected to the input-and-compression means through a second data network.

4. The system of claim 3, further comprising means, actuated by the subscriber, for controlling the control device.

5. The system of claim 4, further comprising means for monitoring and recording which service article has been transmitted and a time during which the service article was transmitted, wherein the monitoring and recording means is connected to the first data network, the high-speed communication network, and the transmitting means.

6. The system of claim 5, wherein the transmitting means comprises a transport network that is connected to the monitoring and recording means and a demultiplexer that is connected to the transport network.

7. The system of claim 6, wherein the high-speed communication network is a data network of broad-band type; the selected service article is placed on the high-speed communication network at a predetermined position in a protocol of the network; and the predetermined position corresponds to the subscriber's control device.

8. The system of claim 7, wherein the signalling means and the exchange unit establish the connection based on an A-number of the subscriber and a number of the first intermediary device corresponding to the selected service, and

the corresponding first intermediary device transmits the A-number of the subscriber to the server corresponding to the selected service article.

9. The system of claim 8, wherein the control device comprises means
5 for comparing a service article transmitted to the control device to the selected service article and, when the comparing means indicates the transmitted and selected service articles are the same, the transmitted service article is presented on the display unit.

10 10. The system of claim 9, wherein the high-speed communication network is an ATM network.

11. The system of claim 10, further comprising a plurality of second
intermediary devices, wherein the second intermediary devices are connected to the
15 first data network, and each second intermediary device is adapted for connection directly to the control device, whereby the exchange unit is unloaded and the subscriber simultaneously can use a telephone connected to the system and can select a service.

20 12. The system of claim 11, further comprising a first asymmetrical digital subscriber line unit that is connected to the control device and to a second asymmetrical digital subscriber line unit that is connected the exchange unit, wherein the second intermediary devices and the demultiplexer are connected to the second asymmetrical digital subscriber line unit.

25

13. The system of claim 12, wherein each first intermediary device comprises modem means for receiving command signals from and transmitting signals to the exchange unit.

14. The system of claim 12, wherein each first intermediary device comprises means for receiving tone signals from the control device and for transmitting tone signals to the control device.

5 15. In a system for service on demand for distribution of n services, which system is intended to be connected to N subscribers display units, wherein said system comprises M control devices, whereby each control device is connected to at least one display unit, said control device receives information about the
10 selectable services via a menu oriented selection system which is locally stored, an exchange unit connected to said control devices and at least one to said exchange unit connected first intermediary device, a to said first intermediary device connected first network, which is connected to a plurality of server means, a to said server means connected communication network and transmitting means which are connected to said communication network and said control devices, the method for
15 service on demand for distribution of n services, comprising the steps of:
transmitting a present main menu from the control device to the display unit;
transmitting control signals from at control means to said control device when selection in the menu are being made via said control means;
transmitting an off-hook signal and a service indicating signal from the
20 control device to said exchange unit when type of service have been selected, for establishing at connection between the control device and said first intermediary device which is intended for said selected type of service;
when the service article have been selected, transmitting data signals regarding the selected service article from the control device to the server means
25 which provides the selected service article;
activating said server means for placing said selected service article on said communication network; and
transmitting said selected service article via said transmitting means to said control device for further transmission to said display unit.

16. The method of claim 15, wherein said step of transmitting an off-hook signal and a service indicating signal includes the steps of:

after transmitting said off-hook signal and said service indicating signal, transmitting a ringing signal from the exchange unit to said first intermediary device
5 which is intended for said selected type of service and a ringing tone from the exchange unit to said control device; and

transmitting an off-hook signal from said first intermediary device to said exchange unit for establishing said connection.

10 17. The method of claim 16, further comprising the step of comparing if the by said control device received service article corresponds to the selected service article.

18. The method of claim 17, further comprising the step of decoding the
15 received service article to a format which can be shown on the display unit if correspondence exists at the comparison; otherwise repeating the steps starting with transmitting of an off-hook signal and a service indicating signal.

19. The method of claim 18, further comprising the step of transmitting
20 an on-hook signal from said control device to said exchange unit for disconnecting said connection between said control device and said first intermediary device.

20. The method of claim 19, wherein said step of transmitting an off-hook signal and a service indicating signal from the control device to said exchange unit
25 makes use of the A-number of the subscriber, and said service indicating signal includes the B-number of said first intermediary device which is intended for said selected type of service.

26

21. The method of claim 20, further comprising the step of recording which service article that has been transmitted and the time during which said service article is transmitted.

5 22. The method of claim 21, wherein the system further comprises an input-and-compression device connected to a second network which in turn is connected to said server means, and the method further comprises the steps of:
entering and compressing new service articles before transmission to said server means; and
10 entering and compressing amendments of the content in said menu-oriented selection system before transmission to said control device.

23. The method of claim 22, wherein each subscriber has at least one telephone set connected to said system, and a telephone call is in progress at the
15 same time as said system is controlled via said control means, and further comprising the steps of:

transmitting a call interrupt signal from said control device for interrupting the telephone call when said control means transmits control signals to said control device;
20 transmitting an off-hook signal and the number (B-number) of the first intermediary device which is intended for said selected service article for establishing a secondary connection between the control device and said first intermediary device;
transmitting control signals from said control device to attain the selected
25 action; and
transmitting a call restore signal from said control device for restoring said telephone call when said action has been executed.

24. The method of claim 22, wherein the system further comprises a
30 plurality M of second intermediary devices, each of which is connected to said

control devices and to said first network, and the method further comprises, following the step of transmitting said selected service article via said transmitting means, the step of transmitting further control signals between said control device and said first intermediary device via said second intermediary device without
5 loading said exchange unit, whereby a subscriber can use a telephone set connected to said system and at the same time control said system via said control means.

25. In a system for service on demand for distribution of n services, which system is intended to be connected to N subscribers display units, wherein
10 said system comprises M control devices, whereby each control device is connected to at least a display unit, said control device receives information about the selectable services via a menu oriented selection system which is locally stored, an exchange unit connected to said control devices and at least one to said exchange unit connected first intermediary device, a to said first intermediary device
15 connected first network, which is connected to a plurality of server means, a to said server means connected communication network and transmitting means which are connected to said communication network and said control devices, the method for service on demand for distribution of n services, comprising the steps of:

transmitting a present main menu from the control device to the display unit;
20 transmitting control signals from a control means to said control device when selection in the menu are being made via said control means;

transmitting an off-hook signal and a service indicating signal from the control device to said exchange unit when first a type of service and second a service article have been selected, for establishing a connection between the control
25 device and said first intermediary device which is intended for said selected type of service;

transmitting data signals regarding the selected service article from the control device to the server means which provides the selected service article;

activation of said server means which places said selected service article on
30 said communication network; and

28

transmitting said selected service article via said transmitting means to said control device for further transmitting to said display unit.

26. The method of claim 25, wherein said step of transmitting an off-hook
5 signal and a service indicating signal includes the steps of:

after transmitting of said off-hook signal and said service indicating signal, transmitting a ringing signal from the exchange unit to said first intermediary device which is intended for said selected type of service and a ringing tone from the exchange unit to said control device; and

10 transmitting an off-hook signal from said first intermediary device to said exchange unit, for establishing said connection.

27. The method of claim 26, further comprising the step of comparing if
the by said control device received service article corresponds to the selected service
15 article.

28. The method of claim 27, further comprising the step of decoding the received service article to a format which can be shown on the display unit if correspondence exists at the comparison; otherwise repeating the steps starting with
20 transmitting of an off-hook signal and a service indicating signal.

29. The method of claim 28, further comprising the step of transmitting an on-hook signal from said control device to said exchange unit for disconnecting said connection between said control device and said first intermediary device.
25

30. The method of claim 29, wherein said step of transmitting an off-hook signal and a service indicating signal from the control device to said exchange unit makes use of the A-number of the subscriber, and said service indicating signal includes the B-number of said first intermediary device which is intended for said
30 selected type of service.

31. The method of claim 30, further comprising the step of recording which service article that has been transmitted and the time during which said service article is transmitted.

5 32. The method of claim 31, wherein the system further comprises an input-and-compression device connected to a second network which in turn is connected to said server means, and further comprising the steps of:

entering and compressing new service articles before transmission to said server means; and

10 entering and compressing amendments of the content in said menu oriented selection system before transmission to said control device.

33. The method of claim 32, wherein each subscriber has at least one telephone set connected to said system, and a telephone call is in progress at the
15 same time as said system is controlled via said control means, and the method further comprises the steps of:

transmitting a call interrupt signal from said control device for interrupting the telephone call when said control means transmits control signals to said control device;

20 transmitting the number (B-number) of the first intermediary device which is intended for said selected service article, for establishing a secondary connection between the control device and said first intermediary device;

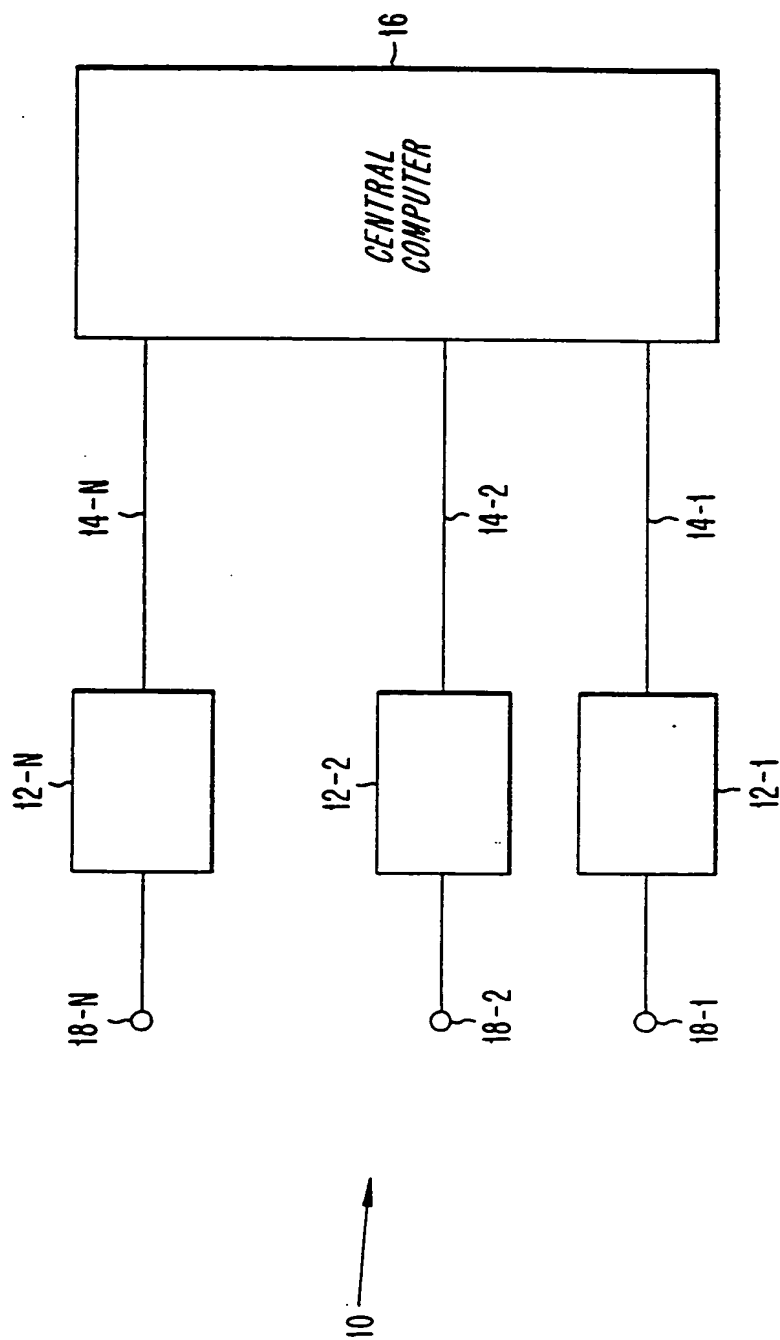
transmitting control signals from said control device to attain the selected action; and

25 transmitting a call restore signal from said control device for restoring said telephone call when said action has been executed.

34. The method of claim 32, wherein the system further comprises a plurality M of second intermediary devices, each of which is connected to said
30 control devices and to said first network, and the method further comprises,

following the step of transmitting said selected service article via said transmitting means, the step of transmitting further control signals between said control device and said first intermediary device via said second intermediary device without loading said exchange unit, whereby a subscriber can use a telephone set connected
5 to said system and at the same time control said system via said control means.

Fig. 1
(PRIOR ART)



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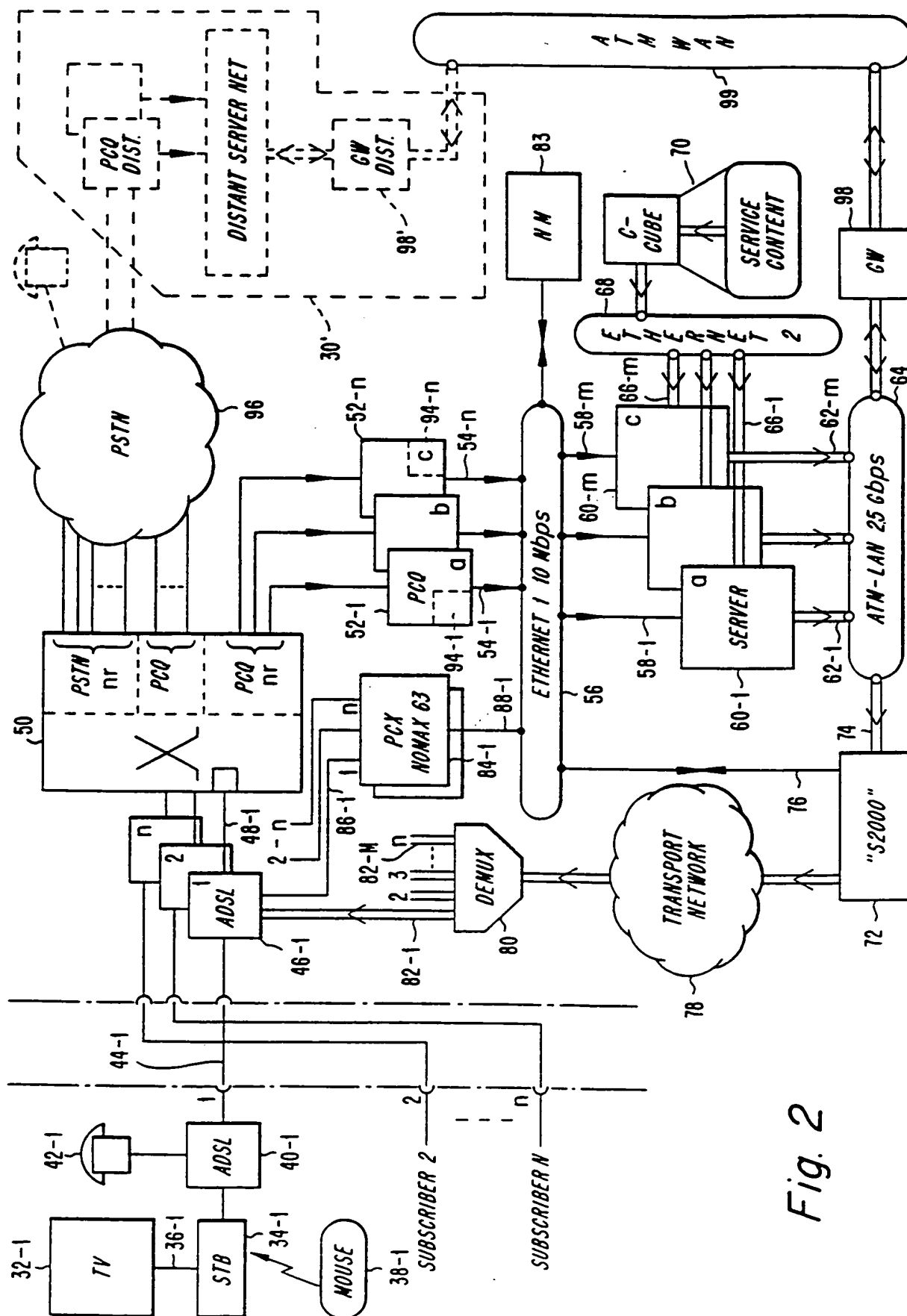
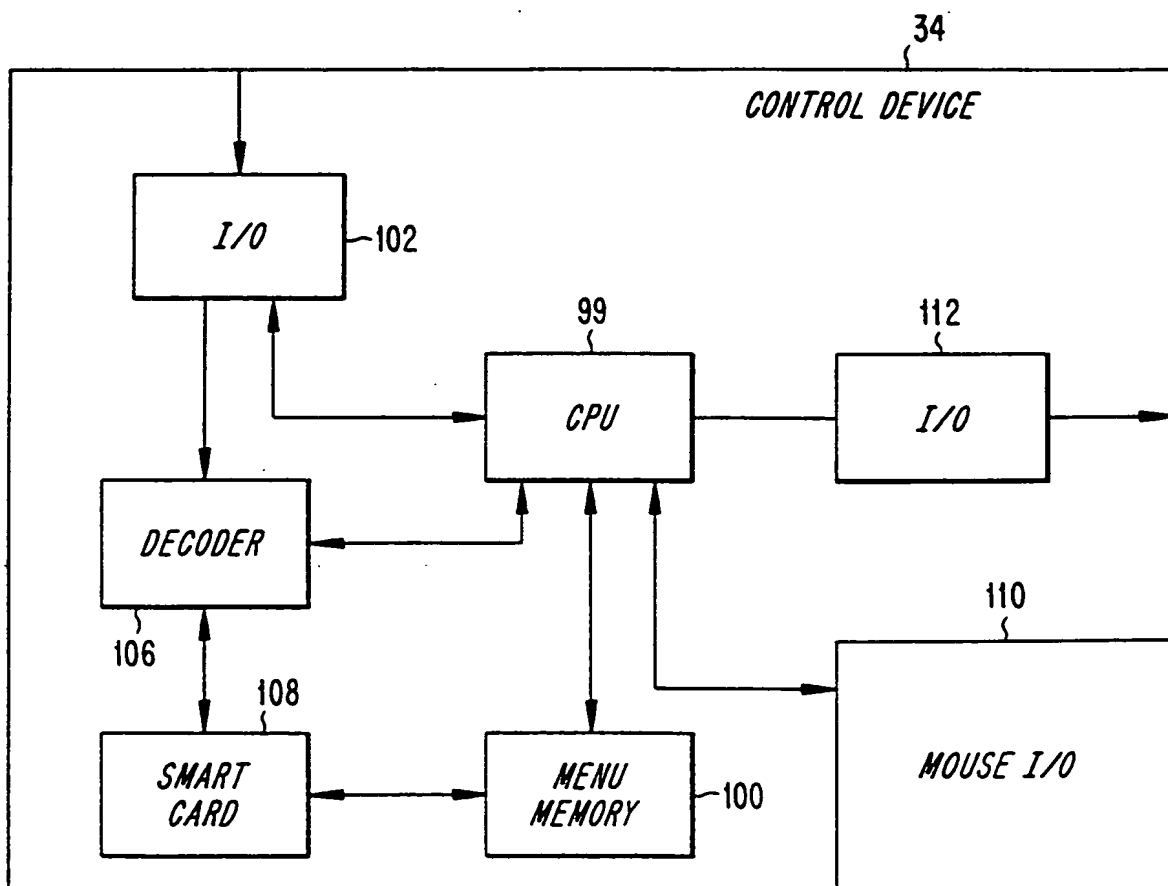


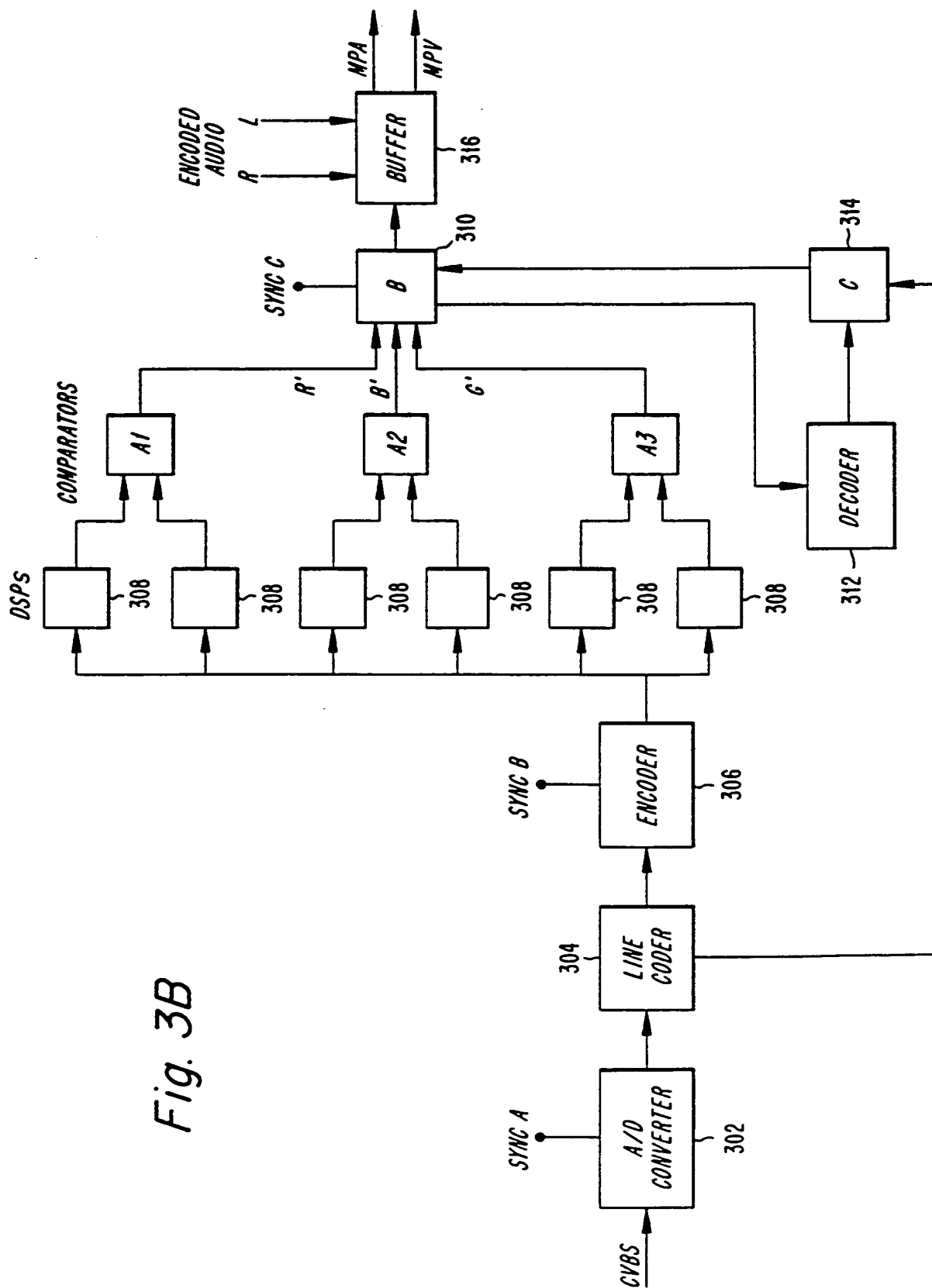
Fig. 2

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Fig. 3A

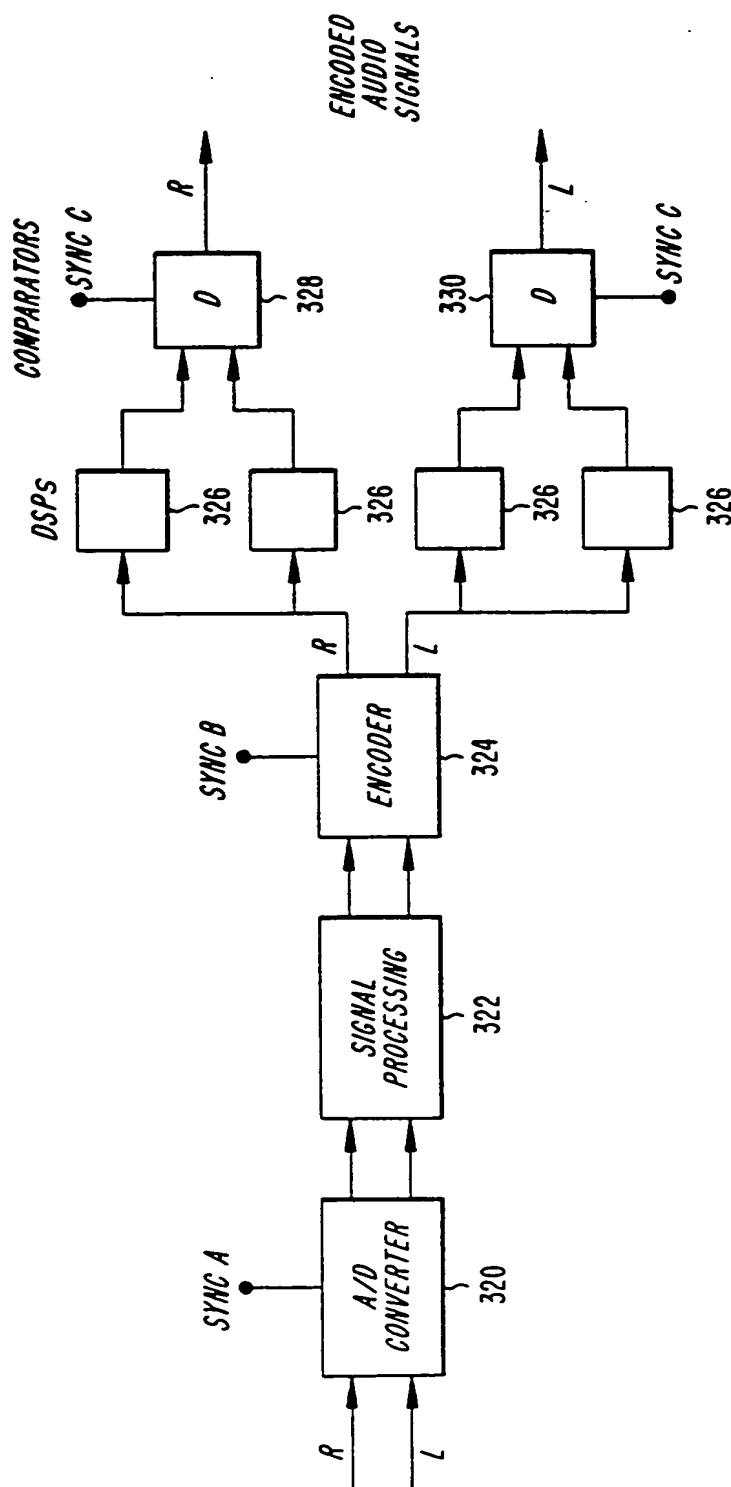


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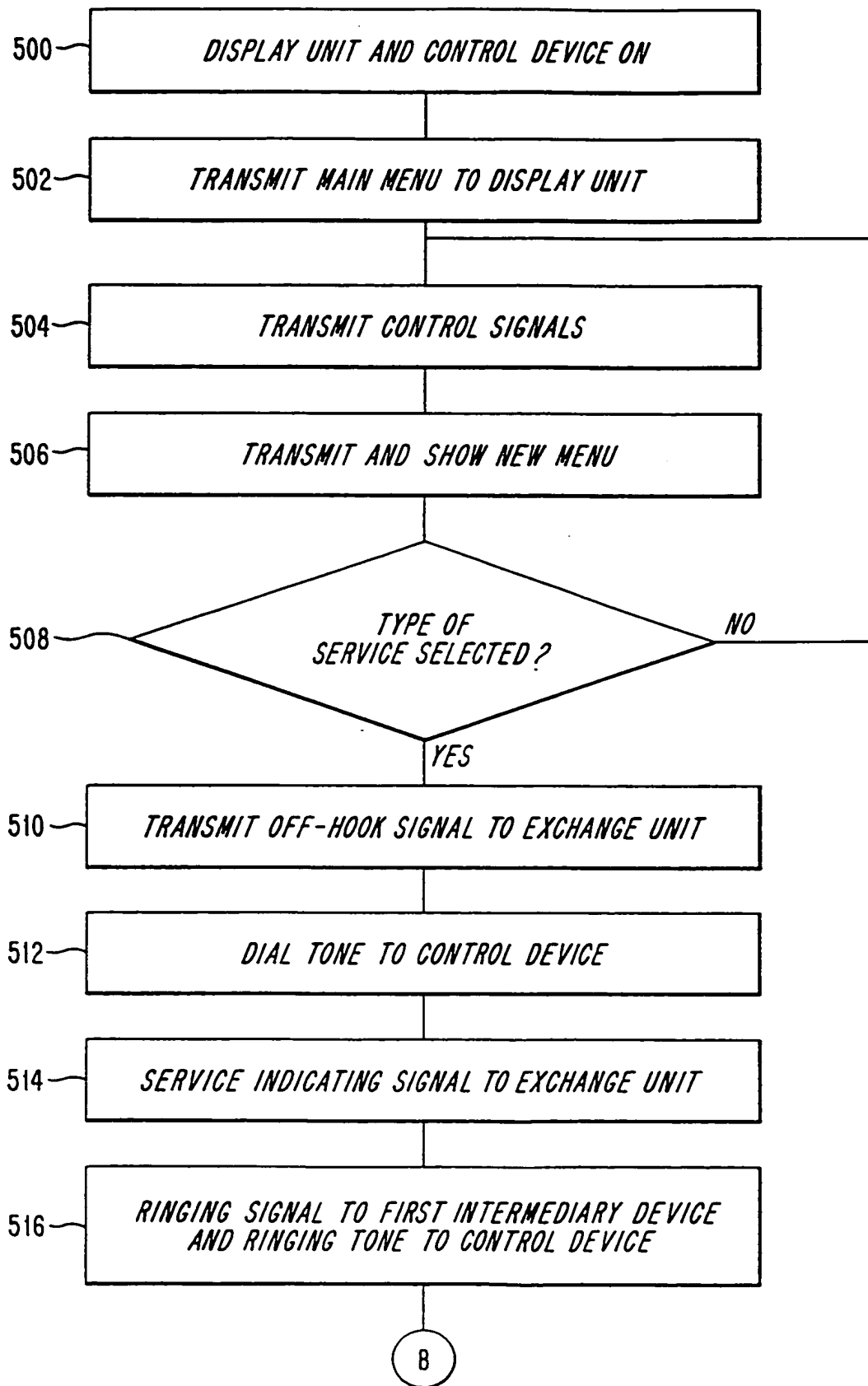


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Fig. 3C

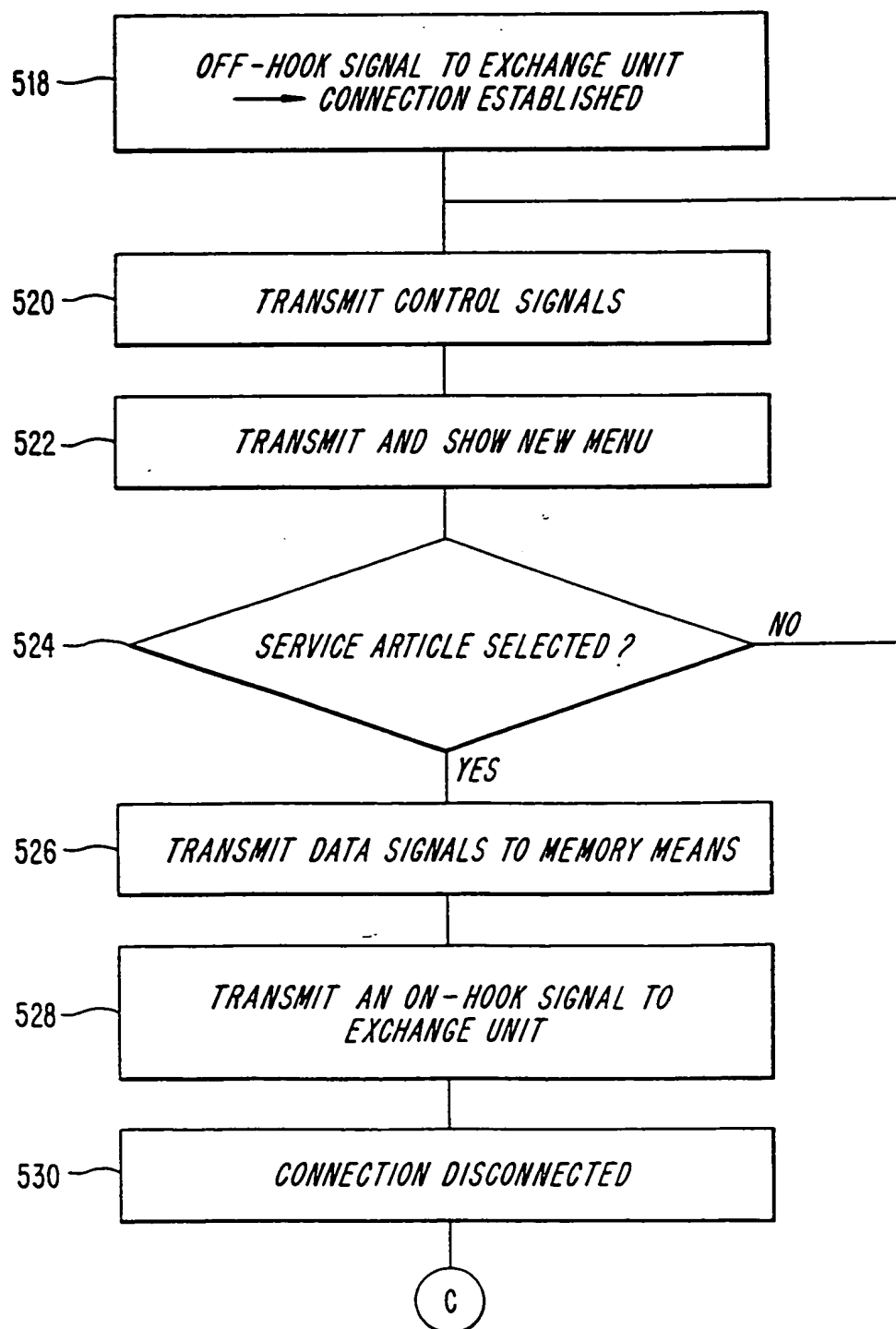


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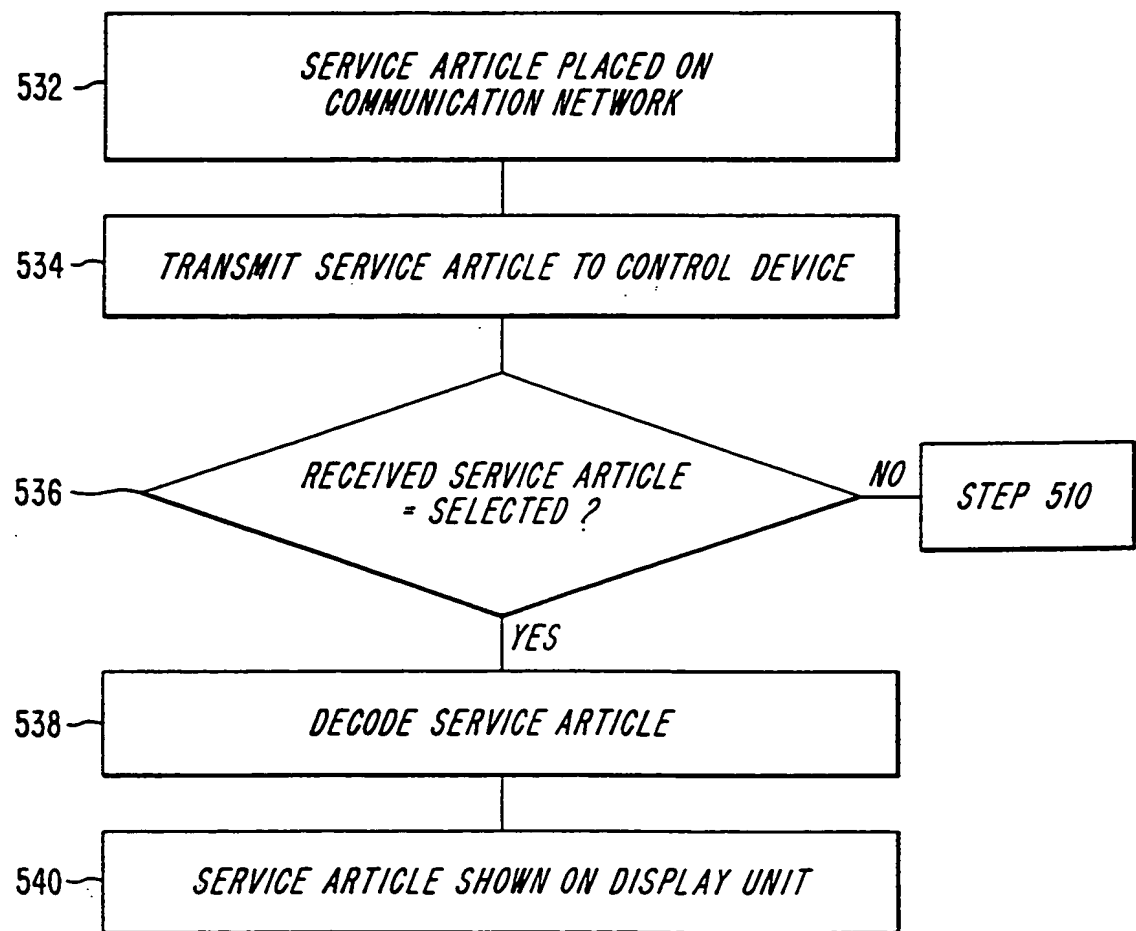
Fig. 4A

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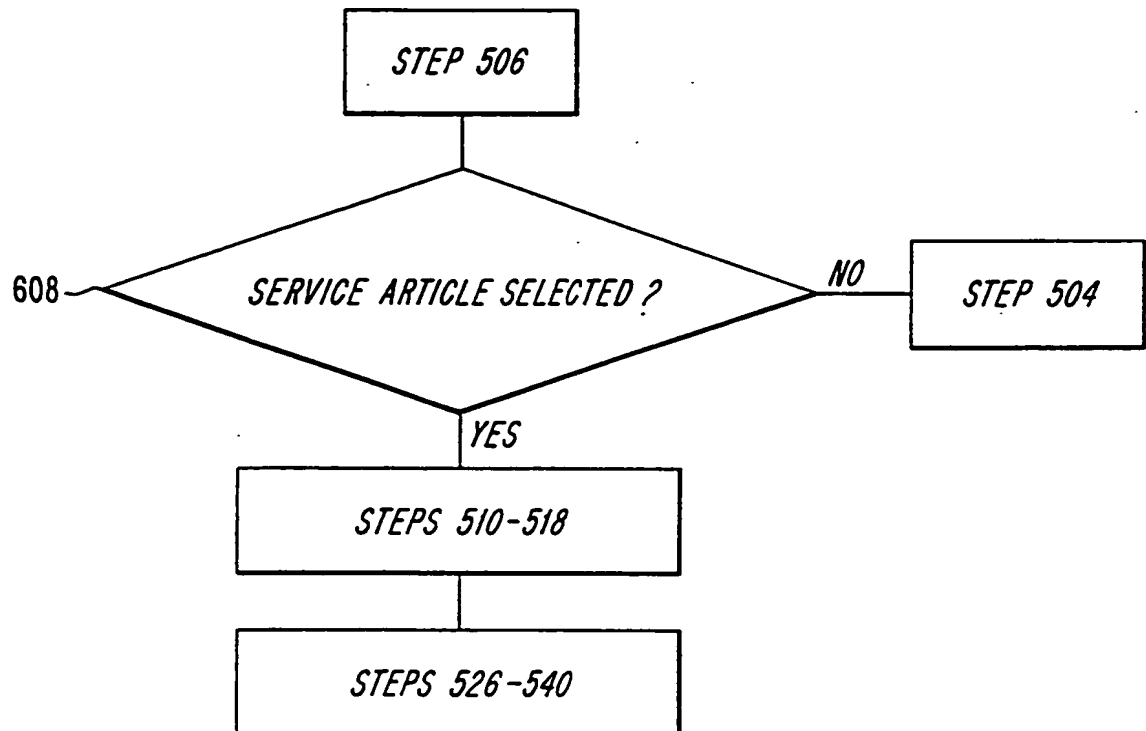
Fig. 4B



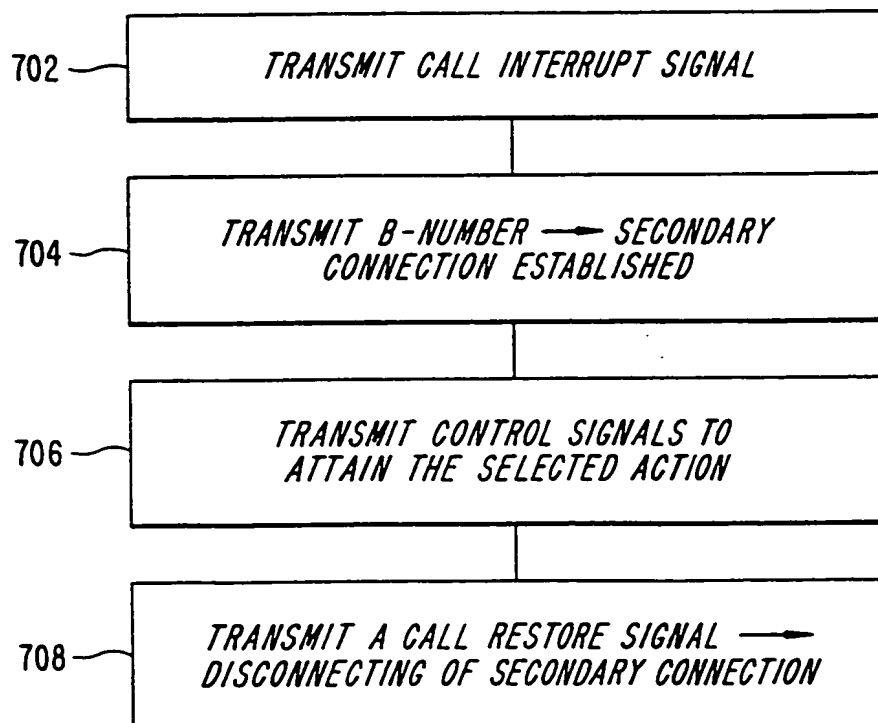
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Fig. 4C

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*Fig. 5*

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Fig. 6A*Fig. 6B*

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 95/01406

A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: H04N 7/173, H04Q 11/04 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC6: H04N, H04Q		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
EPAT, INSPEC		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	IEEE Int. conference on communications, Volume 2, May 1993, A.D. GELMAN et al, "An architecture for interactive applications", page 848 - page 852, see pages 848-850, figure 2,3 --	1-34
A	US 5247347 A (LITTERAL ET AL), 21 Sept 1993 (21.09.93), column 4, line 36 - column 6, line 66; column 10, line 47 - column 11, line 68, figures 2, 5,8 --	1-34
P,X	WO 9530305 A1 (AT & T CORP.), 9 November 1995 (09.11.95), page 2, line 30 - page 6, line 32, figures 1,2 --	1-34
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
9 May 1996		13 -05- 1996
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86		Authorized officer Lars Christerson Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 95/01406

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0617563 A1 (INTERNATIONAL BUSINESS MACHINES CORPORATION), 28 Sept 1994 (28.09.94), column 5, line 19 - column 9, line 23; column 13, line 10 - column 10, line 39, figures 1,3,5,7-10 --	1-34
P,A	US 5371532 A (GELMAN ET AL), 6 December 1994 (06.12.94), see the whole document --	1-34
P,A	US 5410343 A (CODDINGTON ET AL), 25 April 1995 (25.04.95), column 3, line 44 - column 4, line 27, figures 1,2 -- -----	1-34

INTERNATIONAL SEARCH REPORT

Information on patent family members

01/04/96

International application No.

PCT/SE 95/01406

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 5247347	21/09/93	AU-B- 660710 AU-A- 2489492 CA-A- 2120031 EP-A- 0605454 JP-T- 7502629 NZ-A- 244083 US-A- 5410343 WO-A, A- 9306692	06/07/95 27/04/93 01/04/93 13/07/94 16/03/95 28/03/95 25/04/95 01/04/93
WO-A1- 9530305	09/11/95	NONE	
EP-A1- 0617563	28/09/94	NONE	
US-A- 5371532	06/12/94	NONE	
US-A- 5410343	25/04/95	AU-B- 660710 AU-A- 2489492 CA-A- 2120031 EP-A- 0605454 JP-T- 7502629 NZ-A- 244083 US-A- 5247347 WO-A, A- 9306692	06/07/95 27/04/93 01/04/93 13/07/94 16/03/95 28/03/95 21/09/93 01/04/93

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